35. YIELD RESPONSE OF *CALOPHYLLUM INOPHYLLUM* ON INTRODUCTION OF RED ANTS *OECOPHYLLA SMARAGDINA*

Calophyllum inophyllum Linn. is a broad leaved evergreen tree being cultivated for its oil yielding fruit. The oil extracted from the fruit has been used as fuel for rural chimney lamps. *C. inophyllum* bears flowers during April-May and August-September and the large clusters of fruit attain maturity 3-4 months after flowering. About 26-42% of the fruit between 1-2.4 cm in diameter are destroyed by the five striped palm squirrel *Funambulus pennanti* (Seshagiri Rao 1972). The squirrels make holes in the soft seed coat and consume the developing embryo. No biological method is known so far, that can prevent damage to the young fruit by squirrels.

The red weaver ant *Oecophylla smaragdina* Fb., prefers *Calophyllum inophyllum* as one of its host plants (Kumaresan 1998). Its pest control activity has been known for many years. It destroys borer grubs of beetles on date palm (Debach 1974), *Levuana iridescens* on coconut (Tothill *et al.* 1930), citrus shield bugs (Hill 1983) and rhinoceros beetles on coconut (Kumaresan 1996). Keeping this in mind, red ants were introduced on *Calophyllum inophyllum* to check the damage to fruit by squirrels.

Fifty *Calophyllum inophyllum* trees were selected and red ants were introduced on 25 trees. Twenty-five inflorescences were selected from each tree and tagged with numbers at the time of flowering. The number of flowers per inflorescence, number of young fruit in the cluster, number of young fruit damaged by squirrels were studied at flowering time, and the number of mature fruit in a cluster was recorded at harvest time for 3 years between April 1995 and December 1998 (Table 1).

TABLE 1
YIELD RESPONSE OF *CALOPHYLLUM INOPHYLLUM* AFTER RED ANT INTRODUCTION

Treatment	Average No. of Flowers	No. of young fruits	No. of fruits damaged	No. of mature fruits
Antless tree	12	8	3	5
Tree harbouring red ants	12	10	<1	9.4

The higher number of young fruit in trees harbouring ants may be due to the assistance of red ants in pollination. Fruit damaged by squirrels was less than one per cluster, and remained in the cluster for 3-5 days after the damage was caused.

The red ants bit invading squirrels and injected formic acid at the site of the bite. This annoying behaviour of the red ants kept squirrels away from the trees, thus reducing the fruit damage. The daily visits of squirrels ranged from 62 to 83 in ant-free and 26-42 in ant harbouring trees. The odour of the ants might also be responsible for decreased visits to the trees.

Red ants act as pollinators for *Calophyllum inophyllum* and increase fruit set at the flowering stage. In the later stages, they keep the squirrels away from the trees and help to decrease the damage to immature fruit. The red ants can therefore be used to get a good yield from *Callophyllum inophyllum*.

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REFERENCES

DEBACH, PAUL (1974): Biological Control of Natural Enemies, Cambridge University Press, Cambridge, UK.

HILL, D.S. (1983): Agricultural pests of Tropics and Their Control, Cambridge University Press.

KUMARESAN, V. (1996): Prevention of Rhinoceros Beetle in Coconut Palms using Red Ants. *J. Bombay nat. Hist.*

Soc. 93(2): 308-309.

KUMARESAN, V. (1998): Host Plant Range of Arboreal Nestsing Red Weaver Ants in Kanyakumari District of Tamil Nadu (India). *J. Bombay nat. Hist. Soc. 95(1)*: 71-75.

SESHAGIRI RAO, D. (1972): A Hand Book of Plant Protection, S.V. Rangaswamy and Co. Pvt. Ltd., Bangalore.

TOTHILL, J.D., T.H.C. TAYLOR & P.W. PAINE (1930): The Coconut Moth in Fiji. A history of its control by means of parasites. *Publ. Imp. Bur. Entomol.* London pp. 269.

36. ON THE DISTRIBUTION RANGE OF *BAUHINIA GLAUCA GLAUCA* (BENTH.) BENTH. (LEGUMINOSAE: CAESALPINIOIDEAE) IN INDIA

Bentham (1861: 99) mentioned that *Bauhinia glauca* (Benth.) Benth. extends from "Khasia and Burma to Sumatra and Java". The range of distribution was given on the basis of collections in the Hookerian and other herbaria in Kew, and notes and observations of J.D. Hooker on living flora of Sikkim and Khasia (see Bentham 1861, Preface: 11*-13*). Baker (1878: 283), however, did not include Khasia in the distribution of *B. glauca*, although it is quite probable that he too had examined all the collections studied by Bentham in Kew, and had personal knowledge of J.D. Hooker's notes and observations on the living flora of Sikkim and Khasia.

On the other hand, de Wit (1956: 490) and Larsen and Larsen (1973: 10; 1980: 184) again included Khasia, like Bentham, in the world distribution of the taxon. But in subsequent regional floristic studies, it was not recorded from Khasia, now in Meghalaya (Kanjilal *et al.* 1938; Haridasan and Rao 1985). Sanjappa (1992: 3) mentioned that *B. glauca* ssp. *glauca* is found in Meghalaya and Mizoram.

Dr. Sanjappa kindly informed me (1998 *pers. comm.*) that he had given the Indian distribution on the basis of Bentham (1861) and Fischer (1938). After going through the latter, I found that he had enlisted *B. glauca* on the basis of Gage (1901) on the flora of South Lushai hills, now in Mizoram. Gage (1901: 342) reported, without a field number, his own fruiting collection of *Bauhinia glauca* Wall. from Helio hill, Lungleh, at 3,700 ft (1,128 m). Further, he gave the distribution as 'Burma; Malaya; China' and stated that his collection was a decided northward extension for this species. From Holmgren *et al.* (1990: 172, 526), I found that A.T. Gage's collections are in CAL, but despite a thorough search there, I could not locate any fruiting collection of *B. glauca* from South Lushai hills by Gage without a field number. However, a fruiting collection with a duplicate (Helio hill, N.E. of Lungleh, South Lushai hills, 3,700 ft (1,128 m), 3.iv.1899, *Gage* 100 – CAL) identified as *Bauhinia glauca* Wall. was actually found to be *B. glauca* ssp. *tenuiflora* (C.B. Clarke) K. & S. S. Larsen. In fact, all the relevant specimens (*Clarke* 42304 D, 42342 B, *Craib* 177, *Deb* 2439, *Gage s.n.*, 100, *Leslie* 113, *Meebold* 6340, *Mokim* 35, 57, 259, *Rao* 8042, *Watt* 6915, *Wenger* 6 – all CAL; *Kanjilal* 5644 – DD) or their photographs (*Clarke* 42304 E, 42342 A & C, *Watt* 6915 – all K, photo. – CAL) examined so far by me from Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram and Nagaland in northeast India, have been found to be spp. *tenuiflora*, except for the collection *Rao* 8042 – CAL, which comes close to the Chinese taxon *B. glauca* ssp. *hupehana* (Craib) T. Chen (K. & S.S. Larsen *pers. comm.* 1997).

Recently, Larsen and Larsen (1996: 478) stated that ssp. *glauca* is distributed in south India, Burma, Malay Peninsula, Sumatra and Java, but there is neither any collection nor any report of ssp. *glauca* from south India.

The label on the collection *Helfer* 1864 – CAL of ssp. *glauca* showing the locality as